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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/566,326

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EXAMINER

HWU, JUNE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/566,326	<b>Applicant(s)</b> MURASE ET AL.	
	<b>Examiner</b> JUNE HWU	<b>Art Unit</b> 1661	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 25 February 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,2,9-20 and 33-39 is/are pending in the application.
- 4a) Of the above claim(s) 1,2 and 9-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 33-39 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>2/25/09</u> .   | 6) <input type="checkbox"/> Other: _____                          |

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### **DETAILED ACTION**

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on February 25, 2009 has been entered.

### ***Status of the Claims***

Claims 3-8 and 21-32 are cancelled; claims 1-2 and 9-20 are withdrawn; claims 33-39 will be examined on the merits.

All previous objections and rejections not set forth below have been withdrawn due to Applicants' amendments to the claims.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 33 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 33 recites the limitation "the nutrient solution" in line 3. There is insufficient antecedent basis for this limitation in the claim.

### ***Claim Rejections - 35 USC § 103***

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 33-35 and 37-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiraoka (U.S. Patent No. 5,476,523) in view of Hohe et al (Plant Cell Rep (2002) 20:1135-1140) and further in view of Ripetskyj et al (Adv. Space Res. Vol. 23, No. 12, pp. 2005-2010, 1999).

The claims are drawn to a method of producing young moss seedling (*Bryopsida*), wherein a plurality of leafy gametophytes obtained by cuttings are stirred in a nutrient solution (including phytohormone) by bubbling via the pumping of air into said plurality of gametophytes which are suspended in the nutrient solution thereby allowing light to be emitted from 360 degrees of direction, resulting in breeding and growing a plurality of regenerated buds with breeding directionality around the gametophytes, wherein the moss seedlings are used for moss greening.

Hiraoka teach a method of culturing moss tissues such as stems, leaves, etc. which would include gametophyte (col. 9, line 1). A gametophyte is described in the specification as having a leafy gametophyte (p. 9 of instant specification). Hiraoka taught that the young moss seedlings are plants of *Bryopsida* including *Racomitrium* (col. 5 bridging to col. 6). The moss tissues or gametophytes are cut and sterilized and cultured in a 1/5 NA-MS culture media (liquid) containing 0.1-10  $\mu$ M of growth control substance at a temperature of 20-25°C, which is

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between 0-60°C for 30 to 60 days while shaking at 110-120 rpm/min and illuminating a light of about 1000-3000 lux (col. 9, lines 8-12). The nutrient solution may contain kinetin (cytokinin), benzyladenine (cytokinin), indole-3-acetic acid (auxin), 2,4-dichlorophenoxyacetic acid (2,4-D) (auxin), etc. (col. 3, lines 42-48). The conversion of 1000 lux to 3000 lux is between 12.1  $\mu\text{molm}^{-2}\text{s}^{-1}$  to 36.3  $\mu\text{molm}^{-2}\text{s}^{-1}$  under cool white fluorescent lamp, which is not greater than 200  $\mu\text{molm}^{-2}\text{s}^{-1}$ . The moss tissues eventually grew into moss seedlings for moss garden, moss pot etc. which would include moss for greening (col. 11, lines 30-31).

Hiraoka do not teach that the leafy gametophytes of moss are stirred by bubbling via pumping of air into said plurality of gametophytes which are suspended in the nutrient solution allowing light to be emitted from 360 degrees of direction, resulting in breeding and growing a plurality of regenerated buds with breeding directionality around the gametophytes. Hiraoka et al do not teach that the surface tips of said bred regeneration buds are spindle-shaped.

Hohe et al teach a method of growing moss (*Physcomitrella patens*) in bioreactor cultures. Hohe et al teach that suspension cultures of *Physcomitrella patens* were grown in Knop medium (p. 1136, col. 1, lines 1-5). The bioreactor cultures were carried out in a stirred tank glass equipped with a marine impeller running at 500 rpm (5-1 vessels) or 400 rpm (10-1 vessels). The bioreactor cultures were aerated with 0.3 vvm air and grown at 25°C under a photoperiod of 16 hours light and 8 hours dark (repeating light periods and dark periods in cycles of 24 hours or less duration) with the light intensity from Philips TLD 25 lamps of either 120  $\mu\text{mol/m}^2$  per second (5-1 vessels) or 190  $\mu\text{mol/m}^2$  per second (10-1 vessels) (p. 1136, col. 1, 2<sup>nd</sup> par.) The bioreactor cultures aerated with air grew (Fig. 2 and p. 1136, col. 2, 3<sup>rd</sup>).

Ripetskyj et al teach the influence of gravity on the photomorphism of secondary moss protonemata. The protonemata are of the caulonema type wherein these cells have the capacity to form buds (p. 2006, lines 1-2). 1-2 month old shoots of *Pottia intermedia* were

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placed in rows with 0.75% agar Knop II medium, in 60 mm dishes place vertically with the light tight boxes, wherein one side or two opposite sides could be opened for unilateral or bilateral illumination (p. 2006). The white light from warm fluorescent lamps with the intensity of 0.03, 0.15, 0.37, 1.5 and  $4.5 \mu\text{molm}^{-2}\text{s}^{-1}$  were used for the experiment (p. 2006). Ripetskyj further taught that the light intensity of  $0.37 \mu\text{molm}^{-2}\text{s}^{-1}$  from above and below showed buds formation (Table 1). It is noted in Fig. 4 that the buds are spindled shaped which is a result of natural development of the moss. Ripetskyj taught that newly developed buds produced gametophore with higher light intensities (p. 2007, line 1 and Fig. 2).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the method of producing young moss seedlings as taught by Hiraoka with the stirring by bubbling via the pumping of air or the aerating and stirring by bubbling via the aerating and stirring of air into the plurality of gametophytes as taught by Hohe and allowing light to be emitted to said plurality of gametophytes suspended in the nutrient solution from 360 degrees of direction as taught by Ripetskyj because the combination of these methods produced young moss seedlings. One of ordinary skill in the art would have been motivated to bubbling via pumping air or aerating and stirring by bubbling via aerating and stirring air into the plurality of gametophytes given that pumping and stirring of air aided in the growth of culture of *Physcomitrella* as taught by Hohe (p. 1139, col. 1). Moreover, Hohe taught that the when the cultures were aerated with air and supplemented with  $\text{CO}_2$  the growth rate doubled (p. 1139, col. 1 and Fig. 2).

One of ordinary skill in the art would have been motivated to stir the nutrient solution by aerating and stirring by bubbling via aerating and stirring of air into the plurality of gametophytes as taught by Hohe because the stirring would allow the moss tissues to be suspended and not stick to the sides of the culture and would provide additional air to the moss tissue and light

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would be emitted to the gametophytes from 360 degrees of direction. The stirring of the culture would cause the moss tissue to be exposed to the light 360 degrees of direction.

One of ordinary skill in the art would have been motivated to allow light to be emitted from 360 degrees of direction to said plurality of gametophytes suspended in the nutrient solution because the 360 degrees of direction of light would allow more bud differentiating especially on light illuminated from below as taught by Ripetskyj (p. 2006, 1<sup>st</sup> full par. and Table 1). Moreover, when light is directed from above or below, the direction of the light is spread out wherein the moss tissue is receiving the light from all direction. As noted in Table 1, the moss buds are developed no matter where the direction of light is coming. In addition, the plurality of regeneration buds with breeding directionality around the gametophytes is the result from the light exposure.

Although none of the references specifically teach allowing light to be emitted from 360 degrees of direction, one of skilled in the art would be motivated to use 360 degrees of direction because more light would allow more bud differentiation especially from the bottom as taught by Ripetskyj (Table 1).

Furthermore, one of ordinary skill in the art would have a reasonable expectation of success in the combination of Hiraoka in view of Hohe and further in view of Ripetskyj because the production of young moss seedlings would be a choice of experimental design and is considered within the purview of the cited prior art.

From the teachings of the references, it is apparent that one of ordinary skill in the art would have had reasonable expectation of success in producing the claimed invention. Thus, the invention as a whole was clearly *prima facie* obvious to one of ordinary skill in the art at the time the invention was made as evidenced by the cited references.

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Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hiraoka in view of Hohe et al and further in view of Ripetskyj et al as applied to claims 33-35 and 37-39 above, and further in view of Virtanen et al (Plant Ecology 151:129-141, 2000).

The claims are drawn to a method of producing young moss seedling, wherein a plurality of leafy gametophytes obtained by cuttings are stirred in a nutrient solution (fertilizer concentration of 0 to 1.0 (mS/cm) by bubbling via the pumping of air into said plurality of gametophytes which are suspended in the nutrient solution thereby allowing light to be emitted from 360 degrees of direction, resulting in breeding and growing a plurality of regenerated buds with breeding directionality around the gametophytes.

The teachings of Hiraoka in view of Hohe et al and further in view of Ripetskyj et al are discussed above.

Hiraoka in view of Hohe et al and further in view of Ripetskyj et al do not teach that the fertilizer concentration of nutrient solution is of 0 to 1.0 (mS/cm).

Virtanen et al taught effects of fertilizer in bryophyte biomass. Virtanen et al taught that bryophyte biomass was greater when farm yard manure and fishmeal were applied to the plot (p. 133, left col., last par., p. 139, left col., 1<sup>st</sup> full par. and Fig. 1). Farm yard manure and fishmeal are both fertilizers.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the method producing young moss seedlings as taught by Hiraoka in view of Hohe and further in view of Ripetskyj with the addition of fertilizer to the nutrient solution as taught by Virtanen because the addition of fertilizer would enhance the growth of the moss seedlings. One of ordinary skill in the art would have been motivated to do so given that Virtanen noted that greater biomass was found when FYM was applied (p. 133, col. 1, last par.) With regard to the light periods and dark periods in cycles of 24 hours or less duration and



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temperature of 0-6 °C, Hohe taught 25°C under a photoperiod of 16 hours light and 8 hours dark with the light intensity either 120  $\mu\text{mol}/\text{m}^2$  per second (5-1 vessels) or 190  $\mu\text{mol}/\text{m}^2$  per second (10-1 vessels) (p. 1136, col. 1, 2<sup>nd</sup> par.) Furthermore, one of ordinary skill in the art would have a reasonable expectation of success in the combination of Hiraoka in view of Hohe further in view of Ripetskyj and further in view of Virtanen because fertilizing plants is known in the art and would be a choice of experimental design and is considered within the purview of the cited prior art.

Although none of the references specifically teach that the fertilizer concentration of 0-1.0 (mS/cm), one of skilled in the art would be motivated to adjust the concentration of fertilizer for the proper amount of growth because fertilizers are known in the art for the development of plants.

From the teachings of the references, it is apparent that one of ordinary skill in the art would have had reasonable expectation of success in producing the claimed invention. Thus, the invention as a whole was clearly *prima facie* obvious to one of ordinary skill in the art at the time the invention was made as evidenced by the cited references.

### **Conclusion**

No claims are allowed.

### **Correspondence**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to June Hwu whose telephone number is (571) 272-0977. The Examiner can normally be reached Monday through Thursday from 6:00 a.m. to 4:30 p.m.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Anne Marie Grunberg, can be reached on (571) 272-0975. The fax number for the organization where this application or proceeding is assigned is (571) 273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/June Hwu/

Examiner, Art Unit 1661